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A sociological perspective on food security and food insecurity in West Nusa Tenggara Province, Indonesia

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Abstract. The province of West Nusa Tenggara (WNT) once made a history of rice self-sufficiency in Indonesia. In 1984 through the *Gogo Rancah* policy, WNT managed to get out of the food crisis to become self-sufficient in rice. This achievement caught the whole world's attention because President Suharto specifically conveyed this success in a speech at the FAO Forum in Rome in 1984. Since then, the Province of West Nusa Tenggara has become a place of learning for many countries, especially in dryland agriculture with the *gogo rancah* system. This study aims to examine various approaches that have been taken by the government so that they have succeeded in increasing the production and productivity of farmers in WNT, especially for rice commodities. Furthermore, what factors influence that they are successful in their farming business. Another objective is to find out the relationship between food security policies and the occurrence of food insecurity in West Nusa Tenggara. The method applied to answer the problems and objectives of this research is the literature review method. The author collects articles from various relevant scientific journals and takes open data from the Central Statistics Agency. The conclusions of this study are as follows: first, various approaches that the government has taken in dealing with food security in West Nusa Tenggara have succeeded in increasing the production and productivity of rice farmers. Second, the factors that influence the success include the awareness and increasing knowledge of farmers and high participation in the application of the technology introduced. Third, the increase in rice production has not been successfully eliminating the problem of food insecurity in West Nusa Tenggara.

1. Introduction

The issue of food security and poverty alleviation remains interesting to discuss in the case of developing countries, such as Indonesia. Indonesia's success in reducing poverty from 28.60 percent in the 1980s to less than 10 percent in the 2020s cannot be separated from the success of agricultural development during that period. Success in developing the agricultural sector then has an impact on increasing food security. [1,2]. Food security, in this case, according to The United Nations Food and Agriculture Organization



(FAO), defines food security as "physical and economic access to sufficient safe and nutritious food that meets their dietary needs and food preferences for an active and healthy life." [3].

Building food security for developing countries is a top priority because it is also an integral part of poverty reduction programs. The World Bank defines poverty as a multidimensional concept related to low income and consumption, low levels of education and health conditions, and limited nutritional intake and access to basic needs infrastructure [4]. However, poverty in the context of this study is related to food insecurity. According to FAO, food insecurity is a lack of household access to the food needed to live a healthy and active life that lasts for a particular time [3].

The problem of food insecurity, according to the researchers, is not related to the increased production and productivity of farmers but rather to poverty. Amartya Sen, a Nobel Prize in Economics from India in 1998, said that food insecurity is caused by problems in food distribution [3]. About 80% of people with food insecurity in the world are those who live in rural areas. They are farmers with minimal land area, with very simple irrigation or dry land areas with low productivity. According to Godfray and Garnett (2014), one of the indicators, as well as factors that can reduce poverty, is if small farmers can increase their productivity and sustainably create food security[5]. Meanwhile, Harris (2019), and Rekow and Byerlee, 2010 stated that this could be achieved if the small farmers are willing to adopt the right technology and can increase crop yields[6,7]. Another factor is when they can manage their assets and the functioning of various social institutions that support the realization of food security[8,9].

These three topics, food security, poverty, and food insecurity, are of great interest to researchers such as Aiga (2015), Jha et al., (2014), Mahadevan and Suardi (2014), Gundersen et al., (2011). They have an economic background. Thus their review is generally from the point of view of economic theory. Very few have reviewed the issue of food security and poverty from a sociological perspective [10–13]. On the other hand, a review of the issues of food security and poverty from a sociological perspective is still lacking. Therefore, this research elaborates on food security through an interdisciplinary socio-economic perspective. This assumption is based on various economic dynamics that are always related to changes in sociological aspects. On the other hand, a review of the issues of food security and poverty from a sociological perspective is still lacking. Therefore, this research elaborates on food security through an interdisciplinary socio-economic perspective. This assumption is based on various economic dynamics that are always related to changes in sociological aspects.

Savary et al. (2022) have reviewed articles in journals on food security published throughout 2021. A total of 99 papers have been reviewed. The results that can be explained include that not all production factors in the world of agriculture directly influence food security[14]. As an example, Kassie and Akemu (2021) find that the construction of irrigation networks in Ethiopia does not significantly impact food security. However, it does affect farmers' incomes[15]. Another researcher, Madsen et al. (2021), Haq et al. (2021), found a relatively similar conclusion, where the application of technology, including the implementation of "smart farming agricultural practices," only produces food diversity and fulfills nutritional needs, does not significantly affect the problem of food security[16,17]. They can only explain the issue of food diversity at the local level and the application of an agricultural system that is environmentally friendly and easy to adopt.

Larsen and Lilleor's (2014) research on the relationship between Farmer Field Schools and food security and poverty proves a significant relationship between field schools and food security but not poverty[18]. Furthermore, applying appropriate technology through field schools has been proven to increase farmers' production and productivity, thereby directly contributing to household food security. However, this success does not affect changes in various poverty indicators, such as access to basic needs, housing conditions, etc. Finally, according to Mahadivan and Hoang (2015), the relationship between poverty and food security is non-linear, although there is a positive relationship between the two[1]. In

other words, they conclude that household income greatly influences food security at the household level in rural and urban areas.

From the various views above, the researcher wants to elaborate further on the issue of food security about food insecurity. This paper was inspired by the success of Indonesia, especially the Province of West Nusa Tenggara, in agricultural development, especially rice, since the 1980s. This brilliant achievement in the food sector is also complemented by the success of NTB as one of the national food buffer zones. Historically, the increase in rice production and productivity in West Nusa Tenggara began with the implementation of the upland farming system in the early 1980s. The low productivity caused by frequent crop failures, the extent of critical land, and the dry land characteristics that dominate the rice planting area in West Nusa Tenggara can be overcome with the upland rice cropping system.

The researchers adapted and implemented various innovations ranging from superior seeds in optimizing rice yields to the best planting method, namely *Gogo Rancah* Rice Intensification. This technology has been implemented through a movement called *Operasi Tekad Makmur* since the early 1980s. The leading technology that becomes the lever is superior rice seeds with high productivity with planting techniques adapted to when it rains. In addition, optimal utilization of the elements of roots, land, fertilizers, water, and control of plant pests and diseases is also carried out. Furthermore, supporting institutions that already exist are mobilized. Those that do not yet exist are established, such as providing working capital for farming through the Village Unit Cooperative (Bank Rakyat Indonesia), establishing Pateklik Barns in every Village, and Prosperity Barns in every Subdistrict [19].

What factors influence the success of West Nusa Tenggara in changing the situation from hunger to a rice surplus area and a national food barn? The next question is why food insecurity is still happening? What strategies have been implemented to increase food security and prevent or eliminate food insecurity at the household level?

From the various research questions, this research was then carried out with the following specific objectives:

1. Knowing the factors that influence the success of NTB in increasing rice production, even becoming a national food barn, and improving household food security.
2. Knowing the factors that influence the occurrence of food insecurity.
3. Knowing the programs that have been carried out in NTB to improve food security at the household level and, at the same time, eliminate food insecurity in NTB.

The novelty of this paper lies in at least two things. First, this paper wants to explain the phenomenon of food security and food insecurity from a sociological point of view. Second, this paper also reveals historical facts in Indonesia, where the Province of West Nusa Tenggara has become a pride and example in the world, how a region has succeeded in changing starvation conditions with dry agricultural land into a national food barn.

2. Research method

This qualitative research uses a literature review approach to explore various information or data needed. Data was collected by searching for literature from books, research journals, and other sources related to the research theme. It will systematically study the problems related to food security and food insecurity, especially those that occur in West Nusa Tenggara. The data extracted is related to the three issues. For food security, the data extracted is related to:

1. Availability, namely the availability of food for the population.
2. Access, namely the accessibility of food by the people.
3. Utilization, namely proper use to fulfill the nutritional needs of the people.
4. Supply stability and affordable prices.

Meanwhile, for food insecurity, the data collected is related to the availability, distribution, and access at the household scale to food. In addition, data on poverty from year to year will also be explored to obtain its relationship with food insecurity. Data analysis went through several stages. First the data reduction stage; By sorting the collected data, each data is codified based on the suitability of the theme. Second, data presentation; each piece of information that has been selected is presented as is. Third, drawing conclusions; interpreting and describing each data so that it is interrelated and can be understood.

3. Results and discussions

3.1. Success story of food security in NTB

Historically, the implementation of *Gogo Rancah* Rice Intensification in the 1980s has been able to increase the productivity of rice farmers in NTB. Prior to the *Gogo Rancah* system, the productivity of rice farmers in NTB was a maximum of 30.46 ku/ha. However, with the *Gogo Rancah* system, where agricultural areas are included in the dryland rice field category and usually can only plant rice once a year, productivity can increase. This happened as a result of agricultural intensification implemented by the government with a participatory and intensive approach. The productivity of rice farming in NTB then increases from year to year. If in 1981, the productivity was 34.58 ku/ha, then in 1991 it increased to 43.52 ku/ha; Likewise, in 2011 it increased to 49.45 ku/ha and finally in 2021 it increased again to 51.39 ku/ha. This increase in productivity was followed by an increase in harvested area, leading to an increase in food security at the household level of the people in NTB.

Figure 1 below shows the development of rice commodity productivity in West Nusa Tenggara in the period 1980-2021.

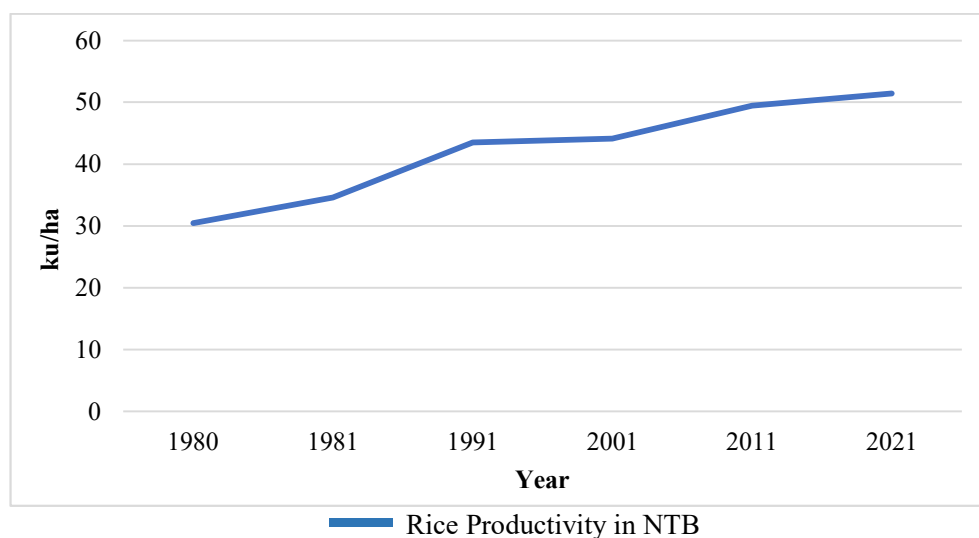


Figure 1. Increased Productivity of Rice Commodities in NTB, 1980-2021.

Resource: BPS NTB, 2000; 2022 [20].

Based on the data above, from 1980, NTB has experienced an increase in rice productivity until 2021. The increase in rice productivity in NTB is not significant, but the data shows that rice productivity has never experienced a decline during that period. This indicates that various changes have occurred; natural

and socio-political factors do not affect the food supply system in NTB. Accessibility and preference for food to continue a healthy and active life in NTB are still in the safe category, as discussed at the World Food Summit in 1996 [21].

3.2. Factors affecting food security and its sustainability

World food security came into focus in 1991 when the World Food Conference declared efforts to eradicate hunger and global malnutrition [22,23]. In its development, the concepts of food security also develop as changes in global needs, including in their definition. The World Food Conference in 1974 and the United Nations in 1975 defined food security as an effort to fulfil nutrition and food security needs following local values and culture [23]. Meanwhile, in 2010 Fisheries and Food Security: The Case of the Sultanate of Oman (Ministry of Fisheries Wealth) emphasized that the fisheries sector is an essential part of food security, and its strategic role rests on socio-economic conditions.

Aspects that need to be highlighted in food security include availability, accessibility, utilization, and price fluctuations. This aspect can be simplified into three dimensions food availability, distribution, and consumption [24]. The NTB Province Regional Food Self-Independence Development Program document (2022) states that the three pillars of food security are the guidelines.

3.2.1. Food availability. Aspects of food availability review can be interpreted as a form of independent food supply [25]. The food system's sustainability is a significant factor in the study of food security [26]. Food sustainability depends on and can be identified through indicators of long-term achievement of food security. As shown in Graph 1, from 1980-2021, NTB is one of the regions that has achieved food security in the long term [27]. Food availability includes the stability and continuity of food supply, originating from domestic production, export, and import activities, and available food reserves [24]. In the NTB Province Regional Food Self-Independence Development Program (2022) document, food availability is identified through domestic food production, food stocks or reserves, and export and import activities.

3.2.2. Affordability. In addition to availability, food security relies on aspects of accessibility or the reach of available food sources. There are at least two indicators of accessibility; how are the food production chain and the transition of eating patterns or consumption needs in a region [28]. The NTB Province Regional Food Self-Independence Development Program document (2022) classifies affordability aspects, including food distribution, supply stability and market prices, logistics systems, stock management, people's purchasing power, and access to markets and available information. The critical success factors for food security are the accessibility of the population to food [29].

3.2.3. Accessibility. This accessibility is primarily determined by the national logistics system (related to the distribution system, transportation, and warehousing facilities and infrastructure), considering that food products are generally not durable. However, the reality today is that the facilities and infrastructure that support the national logistics system can be regarded as inadequate in terms of capacity and quality. Therefore, the population's access to food, especially in remote areas, is still not maximized. As a result, first, there is a reasonably high price difference between surplus and deficit areas.

3.2.4. Utilization. Utilization relies on the quality of nutrition and nutrition in food sources, level of consumption, diversity, quality, and food safety [23]. Utilization is thus a determinant of the value attached to available food commodities.

3.3. Factors affecting food insecurity and how to eliminate it

3.3.1. Aspects of people's income. Based on the data in Graph 1, NTB's food productivity has increased yearly. However, data from the Food Security and Food Insecurity Index in NTB (2022) show that several strategic issues must be highlighted. First, food insecurity in several villages in NTB still occurs. Overall, out of 1143 villages in NTB, there are still 233 villages that fall into the priority category of food insecurity, or around 20%. There are ten sub-districts in NTB with priority food insecurity, including two villages in the Sekotong area, one village in the Praya Barat sub-district, two villages in the Southwest Praya area, one village in the Pujut sub-district, one village in the Keruak sub-district, four villages in the Batulante sub-district, one village in Labuhan Badas, five villages in Pekat sub-district, three villages in Langgudu sub-district, and two villages in East Rasanae sub-district.

Meanwhile, four sub-districts are included in priority II which include Sandubaya - Mataram City, Batulayar - West Lombok, East Rasanae - Bima City, and Asakota - Bima City. Then the sub-districts with priority III include Sekarbela - Mataram City and Raba - Bima City. Food insecurity is closely related to multidimensional crises [30]. The results of the identification of the causes of food insecurity include:

1. The low level of the ratio of land to the village area.
2. The low proportion of food supply facilities and infrastructure to the number of households.
3. The balance of the poor population.
4. Lack of access to clean water.
5. The disproportionate number of residents with health workers.

This situation indicates that the food crisis stems not only from economic factors but also from unequal social geography factors. Furthermore, research results on the impact of the multidimensional crisis that occurred since mid-1997 on dryland agriculture in transmigration areas such as Sulawesi show that food insecurity affects the monetary turmoil [31]. This situation can be seen from the price spike in the input of paddy production, which reached four times. This is in contrast to sales output which has increased, but not significantly. This impacts changes in agricultural systems and farming communities that reduce the need for inputs, reduce upland rice planting land, and shift work to other sectors. Meanwhile, farming communities in several areas of West Java and East Java faced a multidimensional crisis in the 1996-1998 range, which resulted in a decline in national agricultural productivity [32].

3.3.2. Aspects of economic growth. Based on the food security index (IKP) of the NTB province in 2019-2021, NTB was ranked 24th in 2019 with an index of 62.43%, then increased in 2020 to 75.6%. This increase is in line with NTB's IKP rating, which is in position 16 on a national scale. This figure is stable until 2021. The stagnant factor that occurred in 2020-2021 was because the world was facing the Covid-19 pandemic disaster in those years. This is in line with the findings in Aisyah's research (2020), during the pandemic, there was a decline in sales numbers due to disaster mitigation policies[33]. In addition, there was a decline in income and expenditure, which was relatively high for domestic food needs.

3.3.3. Aspects of supply and affordable prices. Miyasto (2014) explained that various food commodities in Indonesia are adequate for food security[29]. This is supported by geographical area, an agricultural area, stable climate and weather, and an agrarian culture which is the primary support for food security. However, various food commodities that should have a surplus were hampered by import policies [29]. The impact is an imbalance of available food and even food diversification at the national level. Indeed, import policies are much more efficient and effective in ensuring national food needs. However, this has resulted in limited opportunities for selling food commodities at the national level.

Furthermore, to diversify food in various regions producing staple commodities other than rice. The homogenization of the staple food of rice in areas where most people do not consume rice results in unequal food availability in the region [29]. Then on the other hand, price affordability is also quite influential on food insecurity, as can be seen in the following table 1.

Table 1. The food supply chain in all regencies of NTB Province.

No.	Commodity	Lotim	Lotara	Sumbar	Sumbawa	Dompu	Bima	Bima City	NTB
(IDR)									
1.	Rice	9,000	9,500	11,000	10,000	10,000	9,000	10,000	8,500
2.	Corn	7,000	7000	6000	6000	6000	8000	6000	6000
3.	Beef	125,000	120,000	120,000	120,000	120,000	120,000	120,000	130,000
4.	Chicken	40,000	42,000	45,000	40,000	50,000	50,000	50,000	45,000
5.	Eggs	22,500	23,500	25,000	24,000	28,500	25,000	27,200	24,000
6.	Cooking oil	18,000	21,000	24,000	30,000	24,000	25,000	29,000	17,500
7.	Sugar	15,000	15,000	15,000	15,000	16,000	15,000	15,000	14,500
8.	Chili	30,000	40,000	45,000	35,000	50,000	50,000	40,000	30,000
9.	Curly chili	24,000	35,000	40,000	35,000	35,000	35,000	40,000	20,000
10	Shallot	20,000	30,000	35,000	30,000	25,000	20,000	25,000	26,000
11	Garlic	26,000	28,000	35,000	30,000	30,000	25,000	30,000	25,000
12	Soybean	14,000	14,000	18,000	12,000	12,000	12,000	12,000	14,000

Resource: BPS NTB, 2022 [20].

Based on the table above, the food supply chain in several regions in NTB has experienced differences due to access adjustments. For example, the staple rice food at IDR 8,500 per kilogram in Mataram has a price difference that is quite different from the Sumbawa Besar area, with the price reaching IDR 11,000. Then this price difference also occurred in *Cabe Rawit* in Mataram with Bima, which earned a difference of IDR 20,000. Thus, large agricultural areas are not a determining factor for food insecurity in the NTB region. In addition, the dominance of food insecurity is influenced by elements of facilities and infrastructure, as well as human aspects.

Food insecurity data in NTB shows that the food security program faces various obstacles that do not only refer to natural resources. On the other hand, an increase in population unequal to the number of health workers in an area causes food insecurity. Furthermore, the carrying capacity of natural resources, irrigation canals, and the lack of interest in preserving agricultural systems to increase the power and quality of agricultural production are currently decreasing [29]. This is exacerbated by the conversion of rice fields into the industrial sector, which has reduced food production.

The NTB government has made several innovations to strengthen food security. Among them are the Take Seeds as Necessary Charity in Sincere (AMBISI) programs targeting the Marbot of Mosques and Houses of Worship. Then P2L Millennials and other Social Organizations such as Youth Organizations, Posyandu, etc. Office P2L by utilizing Civil/TNI/Polri office land. The movement to plant chili and vegetables in the rice fields. Finally, the urban hydroponic village.

4. Conclusion and suggestion

The conclusions of this study are as follows: first, various approaches that the government has taken in dealing with food security in West Nusa Tenggara have succeeded in increasing the production and productivity of rice farmers, 1984 so recently, WNT has been known as one of the national food granaries. Second, the factors that influence the success include the awareness and increasing knowledge of farmers and high participation in the application of the technology introduced. Third, the increase in rice production has not been successfully eliminating the problem of food insecurity in West Nusa Tenggara. These problems occurred because the pattern of using food as one of the pillars of food security has not been appropriately implemented by some community members in West Nusa Tenggara. Food insecurity also occurred due to the poverty problems that still exist. Therefore, to reduce food insecurity, it is recommended that various poverty reduction programs continue to be promoted, such as the Family Hope Program (PKH), expansion of employment opportunities, and capacity building of other human resources. In addition, understanding and implementing food diversity must be encouraged because it is believed to reduce food insecurity in the community.

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